

179C

All-Metal Mass Flo[®] Meter



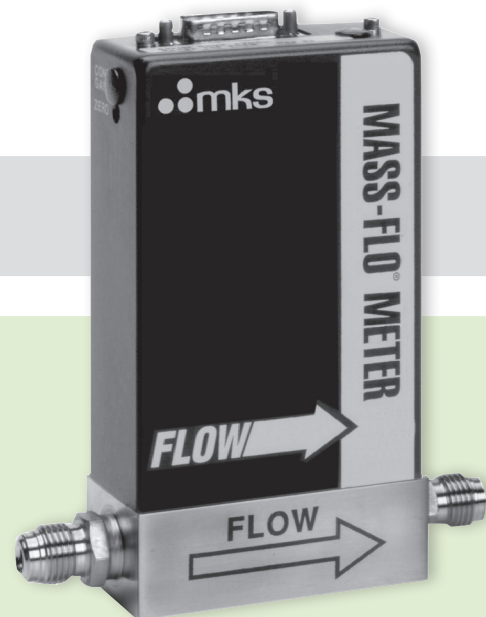
The 179C is an all-metal mass flow meter (MFM) designed to measure the flow of gases in a wide variety of applications. The 179 Mass Flo[®] meters are available with Full Scales from 10 sccm to 20 slm, providing fast, repeatable flow metering to as low as 0.1 sccm.

The 179C is a direct form-fit-function replacement for the most common analog MFMs on the market today.

The standard 3-inch footprint enables the 179C to drop directly into the same space without modifying existing gas lines. Electrical connectors are the same Type "D" connectors, with similar pin-outs, signals, and functions as their industry counterparts. The 179C is compatible with mass flow controller (MFC) power supply and display electronics from MKS or other manufacturers.

Product Features

- Full Scale flow ranges from 10 sccm to 20 slm for precise, repeatable flow measurement and control
- Percent of Full Scale accuracy for analog configurations
- Rigorous design and testing includes MTBF analysis and STRIFE testing to ensure long-term performance
- One year warranty ensures quality and customer satisfaction



Key Benefits

- Patented¹ sensor design provides exceptional zero stability
- All metal, 316L stainless steel for more demanding clean applications

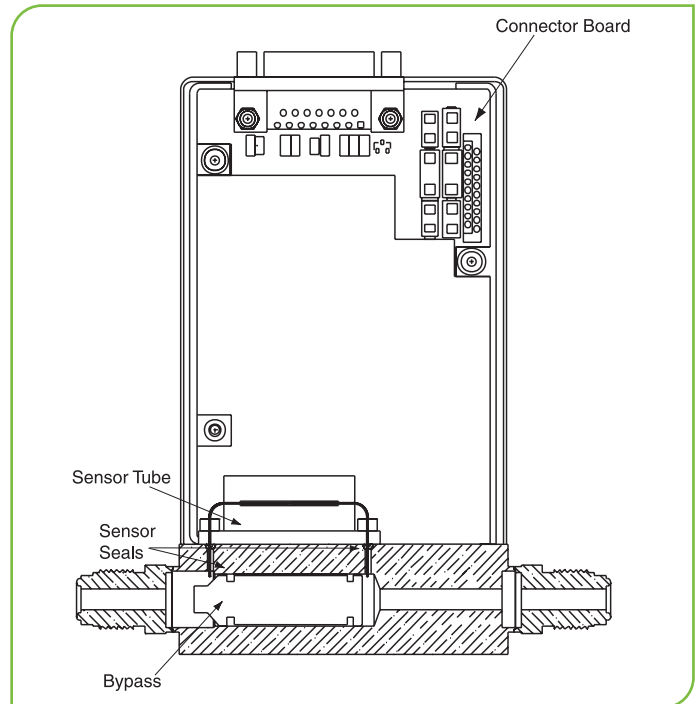
¹U.S. Patent No. 5461913. Foreign Patents Pending.

The 179C employs the latest design thermal sensor for mass flow measurement, in a compact industry-standard package. The all-metal 179C is constructed of 316L stainless steel finished to <32 microinches Ra (max.). The 179C is machined without the use of hydrocarbon based lubricants and cleaned using a proprietary process (MKS Spec. #115029), for the more demanding clean applications. Security against accidental damage is provided by a proof pressure of 1000 psig, and a burst pressure rating of 1500 psig.

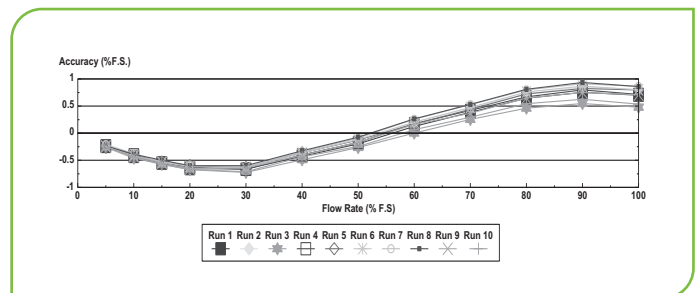
Power required for the 179C is minimal: the nominal ± 15 VDC unit consumes only 50 mA during operation (150 mA at initial turn-on). Fast warm-up (<2 minutes) makes the 179C ideal for production applications where MFM replacement often results in expensive downtime.

Performance and reliability have been designed into the 179C, and ensured through rigorous MTBF analysis and extensive STRIFE testing, which includes humidity soak and temperature cycling. The 179C MFM also complies with European CE Mark requirements. Zero and span drift are minimal with MKS' new patented sensor, as shown by the graph on bottom right.

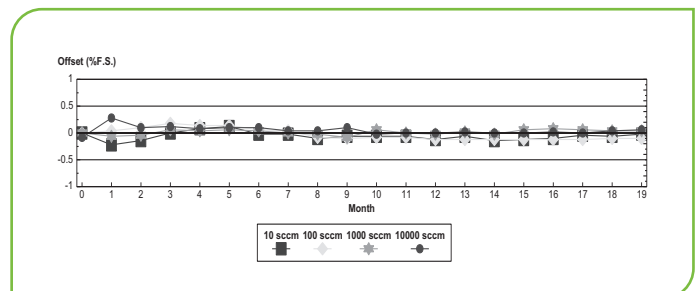
Size, compatibility, cleanliness, reliability, and low cost make the 179C MFM the ideal choice for the more demanding flow measurement applications.



Cross Section Diagram — A cross section diagram of a 179C Mass-Flo® Meter



Flow Accuracy and Repeatability — The above graph shows the typical flow accuracy and repeatability of the 179C MFM. The instrument was measured using the MKS Instruments Califlow® Primary Standard Flow Calibrator.

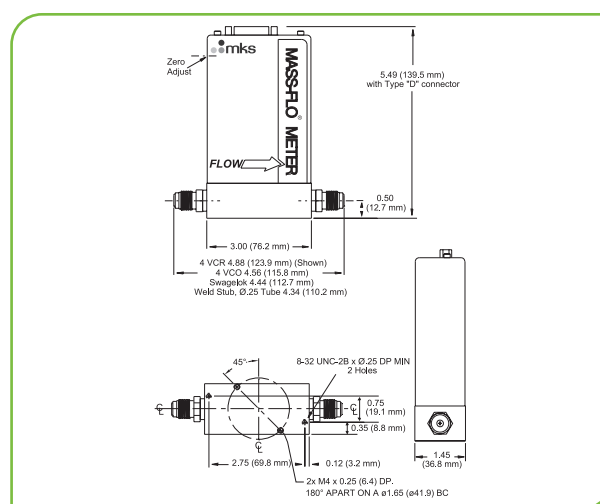


Zero and Span Stability — The above graph shows the excellent zero and span stability of the 179C MFM. The instrument was powered on and randomly tested for zero and span drift over a 300 day period. The total zero drift was less than 10mV while the maximum span drift was less than 32mV.

Specifications	
Full Scale Range (N ₂ equivalent)	10, 20, 50, 100, 200, 500, 1000, 2000, 5000, 10000, 20000 sccm
Maximum Inlet Pressure	500 psig
Normal Operating Pressure Differential (with atmospheric pressure at the MFM outlet)	10 to 20000 sccm: 10 Torr
Measurement Range	1% to 100% of Full Scale
Accuracy (analog) (including non-linearity, hysteresis, and non-repeatability referenced to 760 mmHg and 0°C)	±1.0% of Full Scale
Repeatability	±0.2% of Full Scale
Resolution	0.1% of Full Scale
Temperature Coefficients	
	Zero Span
	<ul style="list-style-type: none"> • <0.05% of Full Scale/°C • <0.08% of Reading/°C
Warm-up Time (to within 0.2% of Full Scale of steady state performance)	<2 min
Pressure Coefficient	<0.02% of Reading/psi
Normal Operating Temperature Range	0°C to 50°C
Input Voltage Required	
Max. at start-up (first 2 sec)	• ±15 VDC (±5%) @ 150 mA
Typical at steady state	• ±15 VDC (±5%) @ 50 mA
Output Signal	0 to 5 VDC into >10K Ω
Output Impedance	<1 Ω
Connector Types	
	Analog
	9-pin or 15-pin Type "D" (The 15-pin Type "D" connector is electronically compatible with other MKS flow controllers. Consult Applications Engineering for details.)
Wetted Materials	
	Standard
	Optional
	<ul style="list-style-type: none"> • 316L S.S. • VCO® fittings (consult factory)
Leak Integrity	
External (scc/sec He)	<1 x 10 ⁻⁹
Fittings (compatible with)	Swagelok® 4 VCR®, Swagelok® 4 VCO®, ¼" Swagelok®
Compliance	CE

Ordering Code Example: 179C00412CR3BM	Code	Configuration
Model		
179C Mass Flo Meter	179C	179C
Gas To Be Calibrated For: (SEMI Gas Code) See table for additional options		
Helium Argon Hydrogen Nitrogen Oxygen	001 004 007 013 015	004
Flow Rate To Be Calibrated For SCCM (Maximum 20000 SCCM N₂ Equivalent)		
10 20 50 100 200 500 1000 2000 5000 10000 20000	11C 21C 51C 12C 22C 52C 13C 23C 53C 14C 24C	12C
Fittings (compatible with)		
Swagelok 4 VCR male Swagelok 4 VCO male 1/4" Swagelok	R G S	R
Valve		
No Valve	3	3
Connector		
Analog 9 pin "D" Analog 15 pin "D"	A B	B
Seal Materials		
Metal Viton (VCO only) Buna-N (VCO only) Neoprene (VCO only) Kalrez (VCO only)	M V B N K	M
Optional Accessories		
946 Multi-channel power supply/readout/set point control		
Cabling		
CB147-12-10 to connect 179C 9-pin Type "D" to 946 and cables 100016744/45/46 to connect 179C 15-pin Type "D" to 946 and cables		

SEMI Gas Code	Name	Symbol	Maximum FS, sccm	Flow Rate
001	Helium	He	30,000	34C
004	Argon	Ar	30,000	34C
007	Hydrogen	H ₂	20,000	24C
008	Air	--	20,000	24C
013	Nitrogen	N ₂	20,000	24C
015	Oxygen	O ₂	20,000	24C
019	Chlorine	Cl ₂	10,000	14C
025	Carbon Dioxide	CO ₂	10,000	14C
028	Methane	CH ₄	10,000	14C
029	Ammonia	NH ₃	10,000	14C
039	Silane	SiH ₄	10,000	14C
042	Acetylene	C ₂ H ₂	10,000	14C
110	Sulfur HexaFluoride	SF ₆	5,000	53C



Dimensional Drawing — Unless otherwise specified, dimensions are nominal values in inches (millimeters referenced).